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30ID Validation Procedure

for the

Generation-3
Personnel Safety System
(PSS)

of the

Advanced Photon Source

at

Argonne National Laboratory
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WBS x.1.4.1.4.30.1

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Table of Contents

1 Introduction

1.1 Purpose

This procedure is the validation test of the functionality of the Beamline Personnel Safety System (PSS).

1.2 Scope

This procedure provides all test sequences required to validate the functionality of the Beamline PSS.

1.3 Applicability

This procedure applies to all the station(s) of this Beamline PSS.

1.4 References

ACIS Validation Test Procedure

PSS Software Description

1.5 Type of Procedure

This Procedure is a "Technical Procedure" with step-by-step check-off and sign-off requirements.

2 BACKGROUND

The foundation of confidence in the functionality of the PSS is the proper performance and success of this validation test procedure. Only if this procedure is properly written, executed, and successfully completed, will the PSS and the Beamline experiments be allowed to operate.

2.1 Annual Execution of this Procedure

According to DOE orders, this procedure shall be successfully complete with a repetition period not to exceed twelve months.

2.2 As-Needed Execution of this Procedure

Repetition of this procedure, or portions thereof, are executed for the following reasons:

A. If the PSS software code is modified in any way, the entire procedure must be executed. This requirement excludes changes to variables that have no effect on the sequences determined by the code. An example of such a variable is the time-out duration for the doors to close.

B. If any component is replaced, or disconnected, a portion of this procedure must be executed to validate the replacement or reconnected component. The extent of this procedure, or the use of an equivalent special test procedure, will be determined and documented by the PSS System Manager or designated alternate.

C. If a component of the PSS is suspected to be faulty due to an apparent malfunction, a portion of this procedure must be executed to validate the suspect component. The extent of this procedure, or the use of an equivalent special test procedure, will be determined and documented by the PSS System Manager or designated alternate.

D. If there is a partial implementation of the system, the testing would entail only the applicable part(s). As sections are added to the beamline, the re-testing must include the old section(s) as well as the one being bought into operation.

3 PROCEDURE FORMAT

3.1 Witness Check-Off and Sign-Off for Software and Hardware

This procedure requires an individual check-off for software and hardware where indicated. The hardware check off verifies that the overall system has performed in the expected manner. The software check-off verifies that the operating state of the two PLC's is the expected ones for the current step in the procedure.

All changes made to the procedure must be signed and dated on the procedure where the exception appears using the “NOTES AND EXCEPTIONS” STAMP and the exception documented at the end of the procedure in the “NOTES AND EXCEPTIONS” section where provisions are made for information about the exception, Do this before continuing with the testing.

All exception must be identified in the ”NOTES AND EXCEPTIONS” section by; (a) a page and section number, (b) a description of the exception, (c) the reference material used to determine any changes, (d) the initials of authorizing personnel, (e) the initials of the person who requested instructions and (f) the dates for each case. When the validation is complete it must be signed-off by the system manger before this beamline is put back on-line.

Typical authorizing personnel includes, system managers or their designated alternate and the reference document is the “DESCRIPTION & REQUIREMENTS” for that beamline.

3.2 Partial Beamline Validations

If all PSS controlled equipment is not ready for testing at the final phase of the full procedure, multiple signature pages will be provided so that the PSS can be validated along with the completed section of a Beamline. A new section of beamline or enclosure not tested and signed-off CANNOT be operated under the control of the PSS until the corresponding testing and sign-off is completed.

3.3 Eligible Witnesses

The witnesses shall read the “PSS VALIDATION HANDBOOK” and use it as a reference document. The “Eligible Witnesses” shall be determined by the “PSS Interlock Systems Section Leader” or designated alternate and each witness shall sign-off on this test procedure at the end of Section 5.

3.4 Review Sign-off

Review sign-off of the validation procedure must be completed before the document is used to validate PSS. The beamline design documents are to be used as reference for reviewing the technical content of the validation document. Eligible reviewers are listed on the signature page.

3.5 Approval Sign-off

Approval sign-off is preformed after the validation is completed. Eligible approvers check the validation document for compliance with ISIG Test Plan's policies and procedures.

3.6 Required Sequence of Testing

Validation personnel are required to perform tests in sequence as presented in the procedure. Once the Validation is started, alteration of the sequence of testing is Not Permitted.

4 PREPARATIONS FOR VALIDATION

4.1 Purpose

Several preliminary assumptions are necessary before the actual test procedure can begin. The steps necessary to support these assumptions are performed by the PSS System Manager or designated alternate prior to the formal testing period and checked off by the test team. Further, the PSS (or the relevant parts) is in an operating condition.

4.2 Proper Test Procedure

The version of this test procedure must be the current version, verified and approved by the APS/AOD-ISIG Document Control Manager. The proper crate address for both PLC's is shown on the cover sheet for this procedure

CHECK TO VALIDATE [ ]

4.3 Monitoring of the Control State for the A and B Chain PLC's

The control state of the software system in the A and B chain PLC's can be observed on a PC using PLC monitor software.

4.4 Proper Beamline Verification

This test will verify that this test procedure corresponds to the version of the software installed and the proper beamline.

A hardwired crate location address is read by the software at regular intervals and must equal the coded address imbedded in the software. Copy this address along with the hardwired and software addresses from the EPICS screen to the indicated locations below.

CHAIN A CHAIN B

Hardwired Beamline Address:_____ _____

CHECK TO VALIDATE [ ]

5 PRELIMINARY PROCEDURES, TEST EQUIPMENT and REFERENCE DOCUMENTS

5.1 Purpose

The purpose is to validate the Personal Safety System for a specific beamline. Formal system validation requires a prior validation of the I/O wiring performed by the PSS VALIDATI**ON** TEAM.

The I/O wiring Validations generate several support documents for the system; the Front End Critical Devices, the 15U box; and the front end distribution panel on the mezzanine. These are individual documented procedures and require at least two validators.

The actual critical devices are verified in the "Front End Critical Devices Validation Procedure".

5.2 External Devices Simulator Installation

An external devices simulator is connected to the PSS. It will simulate the PS1, PS2, SS1, and SS2 critical devices along with the input and output permits to other systems. Then preliminary testing of the system can begin. This will check the I/O wiring, the operation of each device, and the operation of the software sequences.

Connect the external devices simulator to the PSS at the rack distribution panel. The actual shutters are disconnected and disabled (regardless of the position of the global Off-Line switch), all the external input permits are enabled, all the output permits are disabled, and the PLC's sequence as if all input permits are enabled and the shutters are operating.

5.3 Definitions, acronyms. and abbreviations

The following are some of the frequently appearing or unique words or phrases used in this document. These definitions are provided as a quick reference for the reader's convenience.

Down Stream: The direction defined by the path from the Storage Ring to the end of the last Station of a beam line. The beam flow is from the Storage Ring through the Front End Shutters into and through Station A and then to Station B and so on until the beam encounters either a closed Shutter or a beam stop at the end of the last Station.

Up Stream: The direction defined by the path from the end of last Station of a beam line to the Storage Ring. The direction opposite the flow of the beam.

Synchrotron Radiation:

The following are some of the frequently appearing or unique acronyms used in this document. This list is provided as a quick reference for the reader's convenience.

ACIS	Accelerator Control and Interlock System
APS	Advanced Photon Source
ASD	Accelerator Systems Division
BLEPS	Beamline Equipment Protection System
C&C	Command and Control system
CPU	Central Processing Unit
DOE	Department of Energy

ES&H Environment, Safety & Health Manual
EPICS Experimental Physics and Industrial Control System
EPS Equipment Protection System
ESD Emergency Shut Down system
FEEPS Front End Equipment Protection System
FOE First Optics Enclosure
I/O Input Output
IOC Input Output Controller
LAN Local Area Network
NCRP National Council on Radiation Protection
OI Operator Interface
PSS Personnel Safety System
PLC(s) Programmable Logic Controller(s)
PMD Programmable Message Display
SAD Safety Assessment Document
SLAC Stanford Linear Accelerator Center
SRS Software Requirements Specification
TBD To Be Defined/Decided
VME Versa Module Eurocard
XFD Experimental Facilities Division

5.4 Tools required During Validation

- 2-way radios
- Technicians tool bag

5.5 Documents Required During Validation

- Chains A and B I/O lists
- Chain A and B Fault lists
- User Requirements Document
- PSS Validation Handbook

5.6 Safety Awareness

- Be aware of all safety postings in the work area
- When working in a construction area, use steel toe shoes, hard hat and safety glasses
- Automatic doors and shutters present a potential hazard
- Exercised ladder safety practices when using one
- When activating integral shutters position indicator, use a tool (e.g., screwdriver), not your fingers

6 Power-Up and Shutter Operation

6.1 Purpose

To download program to Chain-A and Chain-B PLC.
Determine that any lost of power, lost of watchdog relay, I/O forces, or lost of I/O communications will fault the PLC. In addition an operational test will be perform on the "EPICS" control interface and Station Search.

6.2 Initial conditions below apply to all tests in this section

- **PS1 Opened**
- **PS2, SS1 and SS2 Closed**
- **Pulled out all station "Emergency Stop" buttons**

6.2.1 Chain-A Download Program

Purpose	To download Chain-A program to the Chain-A CPU. Backup Chain-A code to insure Chain-A archive are identical with Chain-A CPU.		
Setup Conditions	• Establish Chain-A CPU write enable mode		
Steps	**Action**	**Expected Results**	**Comments**
		Insure software program on the CD matches with the beamline system.	
1	Copy Chain-A program from CD to Chain-A laptop C:\Project folder.	Observe program exists in the C:\Project folder.	
2	Download program to Chain-A CPU, at the Control Logix interface.	Observe project is download and identical to the Chain-A CD.	
3	Contact Chain-A programmer.	Observe Chain-A code backup.	
		Indicate pass, when all expected results are observed_____.	

6.2.2 Chain-B Download Program

Purpose	To download Chain-B program to the Chain-B CPU. Backup Chain-B code to insure Chain-B archive are identical with Chain-B CPU.		
Setup Conditions	• Establish Chain-B CPU write enable mode		
Steps	**Action**	**Expected Results**	**Comments**
		Insure software program on the CD matches with the beamline system.	
1	Copy Chain-B program from CD to Chain-B laptop C:\Project folder.	Observe program exists in the C:\Project folder.	
2	Download program to Chain-B CPU, at the Control Logix interface.	Observe project is download and identical to the Chain-B CD.	
3	Contact Chain-B programmer.	Observe Chain-B code backup.	
		Indicate pass, when all expected results are observed_____.	

6.2.3 Transfer System to Test Mode

Purpose	To transfer system to test mode.		
Setup Conditions	• Establish system Global Offline • Establish all shutters closed		
Steps	**Action**	**Expected Results**	**Comments**
1	Transfer system to test mode.	Observe system in test mode.	
		Indicate pass, when all expected results are observed_____.	

6.2.4 Chain-A EPICS Communication

Purpose	To determine that EPICS communicates with Chain A.		
Setup Conditions	• Chain-A code downloaded to Chain-A CPU • Insure all faults cleared		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Chain-A 30ID running, on APS EPICS.	
		Indicate pass, when all expected results are observed_____.	

6.2.5 Chain-B EPICS Communication

Purpose	To determine that EPICS communicates with Chain B.		
Setup Conditions	• Chain-A code downloaded to Chain-B CPU • Insure all faults cleared		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Chain-B 30ID running, on APS EPICS.	
		Indicate pass, when all expected results are observed_____.	

6.2.6 Chain-A Force Detection

Purpose	To determine if Chain-A PLC will detect forces present and it will not run when forces are present.		
Setup Conditions	• Chain-A PSS code loaded • All faults cleared		
Steps	**Action**	**Expected Results**	**Comments**
1	Create Chain-A Force.	Observe detect force, Chain-A control panel.	
2		Observe Chain-A Inactive state, Chain-A control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.7 Chain-B Force Detection

Purpose	To determine if Chain-B PLC will detect forces present and it will not run when forces are present.		
Setup Conditions	• Chain-B PSS code loaded • All faults cleared		
Steps	**Action**	**Expected Results**	**Comments**
1	Create Chain-B Force.	Observe detect force, Chain-B control panel.	
2		Observe Chain-B Inactive state, Chain-B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.8 Chain-A Power Cycle

Purpose	Verify that the system will fail safe during a power failure at Chain-A		
Setup Conditions	• Insure all Stations "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Cycle power **OFF** then **ON**, at Chain-A PLC rack.	Observe Chain-A power **OFF**.	
2		To be filled in (TBFI)	
		Indicate pass, when all expected results are observed_____.	

6.2.9 Chain-B Power Cycle

Purpose	Verify that the system will fail safe during a power failure at Chain-B		
Setup Conditions	• Insure all Stations "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Cycle power **OFF** then **ON**, at Chain-B PLC rack.	Observe Chain-B power **OFF**.	
2		To be filled in (TBFI)	
		Indicate pass, when all expected results are observed_____.	

6.2.10 Chain-A Block I/O Communication

Purpose	Verify that the system will fail safe during a lost of I/O communication at Chain-A		
Setup Conditions	• Insure all Stations "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disconnect Chain-A remote I/O cable from the Chain-A PLC rack.	Observe Chain-A system fail safe.	
2	Re-connect Chain-A remote I/O cable to the Chain-A PLC rack.	To be filled in (TBFI)	
		Indicate pass, when all expected results are observed_____.	

6.2.11 Chain-B Block I/O Communication

Purpose	Verify that the system will fail safe during a lost of I/O communication at Chain-B		
Setup Conditions	• Insure all Stations "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disconnect Chain-A remote I/O cable from the Chain-B PLC rack.	Observe Chain-B system fail safe.	
2	Re-connect Chain-A remote I/O cable to the Chain-B PLC rack.	To be filled in (TBFI)	
		Indicate pass, when all expected results are observed_____.	

6.2.12 Enable All Permits

Purpose	To enable station permits User, APS, FEEPS, ACIS Global-Online and ACIS shutter permits		
Setup Conditions	• Establish Chain-A program downloaded to Chain-A PLC • Establish Chain-B program downloaded to Chain-B PLC		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station A "User" key to the right, at Station A "User" panel.	Observe Station A "User" captured to the right, at Station A "User" panel.	
2	Turn Station A "APS" key to the right and then to the left, at Station A "User" panel.	Observe Station A "APS" permit red LED **OFF** and green LED **ON**, at Station A "User" panel.	
3	Turn Station B "User" key to the right, at Station B "User" panel.	Observe Station B "User" captured to the right, at Station B "User" panel.	
4	Turn Station B "APS" key to the right and then to the left, at Station B "User" panel.	Observe Station B "APS" permit red LED **OFF** and green LED **ON**, at Station B "User" panel.	
5	Turn Station C "User" key to the right, at Station C "User" panel.	Observe Station C "User" captured to the right, at Station C "User" panel.	
6	Turn Station C "APS" key to the right and then to the left, at Station C "User" panel.	Observe Station C "APS" permit red LED **OFF** and green LED **ON**, at Station C "User" panel.	
7	Turn Chain-A and Chain-B "ACIS Global-Online" permit switch **ON**, at the FE simulator.	Observe "On-Line" red LED **OFF** and green LED **ON**, at Station A "User" panel.	
8	Turn "FE Shutter ACIS Permit" permit switch **ON**, at the FE simulator.	Observe "ACIS Permit" red LED **OFF** and green LED **ON**, at Station A "User" panel.	
9	Turn "FEEPS OK" permit switch **ON**, at the FE simulator.	Observe "EPS Permit" red LED **OFF** and green LED **ON**, at Station A "User" panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.13 Station A Search and Secure Sequence

Purpose	To determine if a normal search and secure sequence could be perform. When the last door is closed, the search and secure is completed after 20sec. at the Station A.		
Setup Conditions	• Enable all permits • Establish Station A "Door 1", "Door 2" closed and "Door 3" opened • Establish Station A ready for "Search and Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe "SB1" lamp flashing, at the Chain-A panel.	
1	Actuate station A "SB1", at the Chain-A panel.	Observe "SB1" lamp steady **ON**, at the Chain-A panel.	
		Observe "Strobe" lamp (s) are flashing, at the Chain-A panel.	
		Listen for repeated message "Searching Station A, Exit Immediately" , at the Chain-A panel	
		Observe "SB2" lamp flashing, at the Chain-A panel.	
2	Actuate station A "SB2", at the Chain-A panel.	Observe "SB2" lamp steady **ON**, at the Chain-A panel.	
3	Close Station "Door 3", at the Chain-A panel.	Observe "Door 3" completely closed, , at the Chain-A panel.	
4	Start "Stopwatch" as soon as "Door 3" "Closed" green LED , at the Chain-A panel.	No change of status.	
5	Stop "Stopwatch" as soon as 'Station A Search" (To ESD-B) output is **ON,** at Chain-A control panel.	No change of status.	
6	Record "Stopwatch" time.	Recorded time must be within 17-23 seconds _____sec.	
		Indicate pass, when all expected results are observed_____.	

6.2.14 Front End Shutter TestCart Panel TestCase1

Purpose	To determine that the FES will not open while Station A secured with Station B and Station C not secure.		
Setup Conditions	• Enable all permits • Establish Station A "Secured" state • Establish Stations B and C "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Station A secured, Stations B and C not secure, at Chain-A & B control panel.	
2	Depress the FES "Open" button, at a Test Cart control panel.	Listen for an audible error indication, from the xxxx control panel.	
		Observe the FES are closed, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.15 Station B Search and Secure Sequence

Purpose	To determine if a normal search and secure sequence could be perform. When the last door is closed, the search and secure is completed after 20sec. at the Station B.		
Setup Conditions	• Enable all permits • Establish Station B "Door 2" closed and "Door 1" opened • Establish Station B ready for "Search and Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe "SB1" lamp flashing, at the Chain-A panel.	
1	Actuate station B "SB1", at the Chain-A panel.	Observe "SB1" lamp steady **ON**, at the Chain-A panel.	
		Observe "Strobe" lamp(s) are flashing, at the Chain-A panel.	
		Listen for repeated message "Searching Station B, Exit Immediately" , at the Chain-A panel	
		Observe "SB2" lamp flashing, at the Chain-A panel.	
2	Actuate station B "SB2", at the Chain-A panel.	Observe "SB2" lamp steady **ON**, at the Chain-A panel.	
3	Close Station "Door 1", at the Chain-A panel.	Observe "Door 1" completely closed, , at the Chain-A panel.	
4	Start "Stopwatch" as soon as "Door 1" "Closed" green LED , at the Chain-A panel.	No change of status.	
5	Stop "Stopwatch" as soon as 'Station B Search" (To ESD-B) output is **ON,** at Chain-A control panel.	No change of status.	
6	Record "Stopwatch" time.	Recorded time must be within 17-23 seconds _____sec.	
		Indicate pass, when all expected results are observed_____.	

6.2.16 Front End Shutter TestCart Panel TestCase2

Purpose	To determine that the FES will not open from Test control panel while Stations A, B secured, Station C is not secure.		
Setup Conditions	• Enable all permits • Establish Stations A and B "Secured" state • Establish Station C "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Stations A and B secured, Station C not secure, at Chain-A & B control panel.	
1	Depress the FES "Open" button, at a Test Cart control panel.	Listen for an audible error indication, from the xxxx control panel.	
		Observe the FES closed, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.17 Station C Search and Secure Sequence

Purpose	To determine if a normal search and secure sequence could be perform. When the last door is closed, the search and secure is completed after 20sec. at the Station C.		
Setup Conditions	• Enable all permits • Establish Station C "Door 1", "Door 2" closed and "Door 3" opened • Establish Station C ready for "Search and Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe "SB1" lamp flashing, at the Chain-A panel.	
1	Actuate station C "SB1", at the Chain-A panel.	Observe "SB1" lamp steady **ON**, at the Chain-A panel.	
		Observe "Strobe" lamp(s) are flashing, at the Chain-A panel.	
		Listen for repeated message "Searching Station C, Exit Immediately" , at the Chain-A panel	
		Observe "SB2" lamp flashing, at the Chain-A panel.	
2	Actuate station C "SB2", at the Chain-A panel.	Observe "SB2" lamp steady **ON**, at the Chain-A panel.	
3	Close Station "Door 1", at the Chain-A panel.	Observe "Door 1" completely closed, , at the Chain-A panel.	
4	Start "Stopwatch" as soon as "Door 1" "Closed" green LED , at the Chain-A panel.	No change of status.	
5	Stop "Stopwatch" as soon as 'Station C Search" (To ESD-B) output is **ON,** at Chain-A control panel.	No change of status.	
6	Record "Stopwatch" time.	Recorded time must be within 17-23 seconds _____sec.	
		Indicate pass, when all expected results are observed_____.	

6.2.18 Front End Shutter TestCart Panel TestCase3

Purpose	To determine that the FES will open while Stations A, B and C secured.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe Stations A, B and C secured, at Chain-A & B control panel.	
2	Depress the FES "Open" button, at the Test Cart control panel.	Observe the FES opened, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.19 Front End Shutter EPICS Panel

Purpose	To determine that the FES will open and close from EPICS control panel when FES is enable.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Stations A, B and C secured, at Chain-A & B control panel.	
1	Depress the FES "Open" button, at the EPICS control panel.	Observe the FES opened, at Chain-A & B control panel.	
2	Depress the FES "Close" button, at the EPICS control panel.	Observe the FES closed, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.20 Front End Shutter TestCart Panel TestCase4

Purpose	To determine that the FES will not open while Stations A and C secured with Station B not secure.		
Setup Conditions	• Enable all permits • Establish Stations A and C "Secured" state • Establish Station B "Not Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe Stations A, C secured, and Station B not secure, at Chain-A & B control panel.	
2	Depress the FES "Open" button, at a Test Cart control panel.	Listen for an audible error indication, from the xxxx control panel.	
		Observe the FES closed, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.21 Front End Shutter TestCart Panel TestCase5

Purpose	To determine that the FES will not open while Stations B and C secured with Station A not secure.		
Setup Conditions	• Enable all permits • Establish Stations B and C "Secured" state • Establish Station A "Not Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe Stations B, C secured, and Station A not secure, at Chain-A & B control panel.	
2	Depress the FES "Open" button, at a Test Cart control panel.	Listen for an audible error indication, from the xxxx control panel.	
		Observe the FES closed, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

6.2.22 Front End Shutter TestCart Panel TestCase6

Purpose	To determine that the FES will not open while Station C secured with Stations A and B not secure.		
Setup Conditions	• Enable all permits • Establish Station C "Secured" state • Establish Stations A and B "Not Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe Station C secured, Stations A and B not secure, at Chain-A & B control panel.	
2	Depress the FES "Open" button, at a Test Cart control panel.	Listen for an audible error indication, from the xxxx control panel.	
		Observe the FES closed, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7 Station Search and Shutters Tests

7.1 Purpose

To determine Shutter will not open while Station permits not enable. Test station search pending and aborts. In addition, door and shutter race conditions,

7.2 Initial conditions below apply to all tests in this section

- **Pulled out all station "Emergency Stop" buttons**
- **Reset Minor, Serious and Major faults**

7.3 Station A Tests

7.3.1 Station A Door 3 Open Button

Purpose	To determine door 1 and FES race condition, station A door 3 will not open while FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the FES "open" pushbutton at Station A "User" panel and wait ½ second, then depress "Door 3" "open" pushbutton at Station A "Door 3" panel.	Listen for an audible error indication from Station A "Door 3" panel.	
		Observe FES opened green **ON,** at Chain-A & B control panel.	
		Observe Station A "Door 3" closed green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.2 Station A Door 3 and FES Open Button

Purpose	To determine door 3 and FES race condition, station A FES will not open while door 3 is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Door 3" "Open" pushbutton at Station A "Door 3" panel and wait ½ second, then depress FES "Open" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station A "Door 3" closed green **ON,** at Chain-A control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.3 Station A Door 1 Open Button

Purpose	To determine door 1 and FES race condition, station A door 1 will not open while FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the FES "open" pushbutton at Station A "User" panel and wait ½ second, then depress "Door 1" "open" pushbutton at Station A "Door 1" panel.	Listen for an audible error indication from Station A "Door 1" panel.	
		Observe FES opened green **ON,** at Chain-A & B control panel.	
		Observe Station A "Door 1" closed green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.4 Station A Door 1 and FES Open Button

Purpose	To determine door 1 and FES race condition, station A FES will not open while door 1 is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Door 1" "Open" pushbutton at Station A "Door 1" panel and wait ½ second, then depress FES "Open" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station A "Door 1" closed green **ON,** at Chain-A control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.5 Station A Door 2 Lock and FES Opened

Purpose	To determine station A door 2 will not Unlocked while Station A FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Door 2" "Unlock" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station A "Door 2" Locked green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.6 Station A Door 2 Unlocked and FES Not Open

Purpose	To determine station A FES will not open while Station A door 2 is unlocked.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state • Establish Station A "Door 2" Unlocked		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Station A "Door 2" UnLocked green **ON,** at Chain-A & B control panel.	
1	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.7 Station A APS Permit

Purpose	To determine station A FES will close and will not open while Station A "APS" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station A "APS" key to the right then to the left to disable APS permit, at Chain-A & B control panel.	Observe Station A "APS" disabled red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.8 Station A User Permit

Purpose	To determine Station A FES will close and lose Station A search when Station A "User" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station A "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Observe Station A "User" disabled red **ON,** at Chain-A & B control panel.	
		Observe Station A "Search" disabled red **ON,** at Chain-A & B control panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.9 Station A Search Button 2 Search Sequence

Purpose	To determine Station A "Search and Secure" will not start with Search Button 2 (SB2).		
Setup Conditions	• Enable all permits • Establish Stations A ready for "Search and Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
		Observe station A "SB2" lamp OFF, at the Chain-A panel.	
1	Turn ON station A "SB2", at the Chain-A panel.	Observe no change of status.	
		Indicate pass, when all expected results are observed_____.	

7.3.10 Station A Door 3 Search Pending

Purpose	To determine Station A "Search" pending "Search Button 1" lamp will stop flashing when Station A door 3 is closed.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station A "Door 3" closed switch, at the Chain-A panel.	Observe station A "Door 3" closed switch ON, at the Chain-A panel.	
		Observe station A "SB1" lamp **OFF**.	
		Indicate pass, when all expected results are observed_____.	

7.3.11 Station A Door 3 Search Abort

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
2	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
3	Turn ON station A "Door 3" closed switch, at the Chain-A panel.	Observe "Door 3" closed switch ON, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station A Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.3.12 Station A Door 2 Search Pending

Purpose	To determine Station A "Search" pending "Search Button 1" lamp will stop flashing when Station A door 2 is opened.		
Setup Conditions	• Enable all permits • Establish door 2 unlocked state • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station A "Door 2" closed switch, at the Chain-A panel.	Observe station A "Door 2" closed switch OFF, at the Chain-A panel.	
		Observe station A "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.13 Station A Door 2 Search Abort

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish door 2 unlocked state • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
2	Turn OFF station A "Door 2" closed switch, at the Chain-A panel.	Observe station A "Door 2" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station A Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.3.14 Station A Door 1 Search Pending

Purpose	To determine Station A "Search" pending "Search Button 1" lamp will stop flashing when Station A door 1 is opened.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
2	Turn OFF station A "Door 1" closed switch, at the Chain-A panel.	Observe "Door 1" closed switch OFF, at the Chain-A panel.	
		Observe station A "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.15 Station A Door 1 Search Abort

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
2	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
3	Turn OFF station A "Door 1" closed switch, at the Chain-A panel.	Observe "Door 1" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station A Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.3.16 Station A Emergency Stop 1 Search Pending

Purpose	To determine Station A "Search" pending "Search Button 1" lamp will stop flashing when Station A Emergency Stop 1 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station A "ES1" closed switch, at the Chain-A panel.	Observe station A "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.17 Station A Emergency Stop 1 Search Abort

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
2	Turn OFF station A "ES1" closed switch, at the Chain-A panel.	Observe station A "ES1" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station A Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.3.18 Station A Emergency Stop 2 Search Pending

Purpose	To determine Station A "Search" pending "Search Button 1" lamp will stop flashing when Station A Emergency Stop 2 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station A "ES2" closed switch, at the Chain-A panel.	Observe station A "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.19 Station A Emergency Stop 2 Search Abort

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
2	Turn OFF station A "ES2" closed switch, at the Chain-A panel.	Observe station A "ES2" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station A Search Invalid" to start.	

7.3.20 Station A User Key Search Pending

Purpose	To determine Station A "Search" pending "Search Button 1" lamp will stop flashing when Station A User key disabled.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
2	Turn Station A "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Observe station A "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.3.21 Station A User Key Search Abort

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
2	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
3	Turn Station A "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Listen for previous message to end and the new message "Station A Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.3.22 Station A Door 3 Open While Search and Securing

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
2	Turn ON station A "SB2", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
3	Turn ON station A "Door 3" closed switch, at the Chain-A panel.	Observe station A "Door 3" closed switch ON, at the Chain-A panel.	
4	Turn OFF station A "Door 3" closed switch, at the Chain-A panel.	Listen for previous message to end and the new message "Station A Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.3.23 Station A Door 1 Open While Search and Securing

Purpose	To determine while "Search and Securing" Station A, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
2	Turn ON station A "SB2", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
3	Turn ON station A "Door 3" closed switch, at the Chain-A panel.	Observe "Door 3" closed switch ON, at the Chain-A panel.	
4	Turn OFF station A "Door 1" closed switch, at the Chain-A panel.	Listen for previous message to end and the new message "Station A Search Invalid" to start.	

		Indicate pass, when all expected results are observed_____.	

7.3.24 Station A Door 1 Emergency Egress 1

Purpose	To determine if a normal Emergency Egress could be perform.		
Setup Conditions	• Enable all permits • Establish Stations A Door 1 closed		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Emergency Egress #1" pushbutton, in Station A enclosure.	Observe Door 1 open, Station A enclosure.	
		Observe on Chain-A PC monitor fault #474.	
2	Depress open pushbutton, at Station A Door 1 panel.	Observe no change in status.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor" and "Ser/Maj" green LEDs are steady ON.	
		Indicate pass, when all expected results are observed_____.	

7.3.25 Station A Door 3 Emergency Egress 2

Purpose	To determine if a normal Emergency Egress could be perform.		
Setup Conditions	• Enable all permits • Establish Stations A Door 3 closed		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Emergency Egress #2" pushbutton, in Station A enclosure.	Observe Door 3 open, Station A enclosure.	
		Observe on Chain-A PC monitor fault #474.	
2	Depress open pushbutton, at Station A Door 3 panel.	Observe no change in status.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor" and "Ser/Maj" green LEDs are steady ON.	
		Indicate pass, when all expected results are observed_____.	

7.3.26 Station A Search Time Interval

Purpose	To determine that the search message will annunciate for a predetermined time interval, during the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations A "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station A "SB1" lamp flashing, at the Chain-A panel.	
1	Simultaneously start "Stopwatch" and turn ON station A "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station A Exit Immediately".	
2	Depress "Stopwatch" "Timelap" button as soon as "Station A Search Invalid" message starts.	Listen for a repeated messages "Station A Search Invalid".	
3	Record the first "Timelap" (T1).	Recorded time must be within 90-100 seconds_____sec.	
4	Depress "Timelap" button as soon as "Station A Search Invalid" messages has ended.	No change in status.	
5	Record second "Timelap" (T2).	Record the differences between T2 and T1. Their difference must be within 10-15 seconds_____sec.	
		Indicate pass, when all expected results are observed_____.	

7.4 Station B Tests

7.4.1 Station B Door 1 Open Button

Purpose	To determine door 1 and FES race condition, station B door 1 will not open while FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the FES "open" pushbutton at Station B "User" panel and wait ½ second, then depress "Door 1" "open" pushbutton at Station B "Door 1" panel.	Listen for an audible error indication from Station B "Door 1" panel.	
		Observe FES opened green **ON,** at Chain-A & B control panel.	
		Observe Station B "Door 1" closed green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.2 Station B Door 1 and FES Open Button

Purpose	To determine door 1 and FES race condition, station B FES will not open while door 1 is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Door 1" "Open" pushbutton at Station B "Door 1" panel and wait ½ second, then depress FES "Open" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station B "Door 1" closed green **ON,** at Chain-A control panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.3 Station B Door 2 Lock and FES Opened

Purpose	To determine station B door 2 will not Unlocked while Station B FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the Station B "Door 2" "Unlock" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station B "Door 2" Locked green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.4 Station B Door 2 Unlocked and FES Not Open

Purpose	To determine station B FES will not open while Station B door 2 is unlocked.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state • Establish Station B "Door 2" Unlocked		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Station B "Door 2" UnLocked green **ON,** at Chain-A & B control panel.	
1	Depress the Station B FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.5 Station B APS Permit

Purpose	To determine station B FES will close and will not open while Station B "APS" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station B "APS" key to the right then to the left to disable APS permit, at Chain-A & B control panel.	Observe Station B "APS" disabled red **ON,** at Chain-A & B control panel.	
2	Depress the Station B FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.6 Station B User Permit

Purpose	To determine Station B FES will close and lose Station B search when Station B "User" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station B "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Observe Station B "User" disabled red **ON,** at Chain-A & B control panel.	
		Observe Station B "Search" disabled red **ON,** at Chain-A & B control panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.7 Station B Search Button 2 Search Sequence

Purpose	To determine Station B "Search and Secure" will not start with pushing Search Button 2 (SB2) .		
Setup Conditions	• Enable all permits • Establis h Stations B ready for "Search and Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
		Observe station B "SB2" lamp OFF, at the Chain-A panel.	
1	Turn ON station B "SB2", at the Chain-A panel.	Observe no change of status.	
		Indicate pass, when all expected results are observed_____.	

7.4.8 Station B Door 1 Search Pending

Purpose	To determine Station B "Search" pending "Search Button 1" lamp will stop flashing when Station B door 1 is closed.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "Door 1" closed switch, at the Chain-A panel.	Observe station B "Door 1" closed switch ON, at the Chain-A panel.	
		Observe station B "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.9 Station B Door 1 Search Abort

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn ON station B "Door 1" closed switch, at the Chain-A panel.	Observe station B "Door 1" closed switch ON, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.10 Station B Door 2 Search Pending

Purpose	To determine Station B "Search" pending "Search Button 1" lamp will stop flashing when Station B door 2 is opened.		
Setup Conditions	• Enable all permits • Establish Station B door unlocked state • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station B "Door 2" closed switch, at the Chain-A panel.	Observe station B "Door 2" closed switch OFF, at the Chain-A panel.	
		Observe station B "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.11 Station B Door 2 Search Abort

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Station B door unlocked state • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn OFF station B "Door 2" closed switch, at the Chain-A panel.	Observe station B "Door 2" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.12 Station B Emergency Stop 1 Search Pending

Purpose	To determine Station B "Search" pending "Search Button 1" lamp will stop flashing when Station B Emergency Stop 1 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station B "ES1" closed switch, at the Chain-A panel.	Observe station B "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.13 Station B Emergency Stop 1 Search Abort

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn OFF station B "ES1" closed switch, at the Chain-A panel.	Observe station B "ES1" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.14 Station B Emergency Stop 2 Search Pending

Purpose	To determine Station B "Search" pending "Search Button 2" lamp will stop flashing when Station B Emergency Stop 2 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station B "ES2" closed switch, at the Chain-A panel.	Observe station B "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.15 Station B Emergency Stop 2 Search Abort

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn OFF station B "ES2" closed switch, at the Chain-A panel.	Observe station B "ES2" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.16 Station B Emergency Stop 3 Search Pending

Purpose	To determine Station B "Search" pending "Search Button 3" lamp will stop flashing when Station B Emergency Stop 3 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station B "ES3" closed switch, at the Chain-A panel.	Observe station B "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.17 Station B Emergency Stop 3 Search Abort

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn OFF station B "ES3" closed switch, at the Chain-A panel.	Observe station B "ES3" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.18 Station B User Key Search Pending

Purpose	To determine Station B "Search" pending "Search Button 1" lamp will stop flashing when Station B User key disabled.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn Station B "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Observe station B "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.4.19 Station B User Key Search Abort

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn Station B "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.20 Station B Door 1 Open While Search and Securing

Purpose	To determine while "Search and Securing" Station B, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
1		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
2	Turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
3	Turn ON station B "Door 1" closed switch, at the Chain-A panel.	Observe station B "Door 1" closed switch ON, at the Chain-A panel.	
4	Turn OFF station B "Door 1" closed switch, at the Chain-A panel.	Listen for previous message to end and the new message "Station B Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.4.21 Station B Door 1 Emergency Egress 1

Purpose	To determine if a normal Emergency Egress could be perform.		
Setup Conditions	• Enable all permits • Establish Stations B Door 1 closed		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Emergency Egress #1" pushbutton, in Station B enclosure.	Observe Door 1 open, Station B enclosure.	
		Observe on Chain-A PC monitor fault #474.	
2	Depress open pushbutton, at Station B Door 1 panel.	Observe no change in status.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor" and "Ser/Maj" green LEDs are steady ON.	
		Indicate pass, when all expected results are observed_____.	

7.4.22 Station B Search Time Interval

Purpose	To determine that the search message will annunciate for a predetermined time interval, during the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station B "SB1" lamp flashing, at the Chain-A panel.	
1	Simultaneously start "Stopwatch" and turn ON station B "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Depress "Stopwatch" "Timelap" button as soon as "Station B Search Invalid" message starts.	Listen for a repeated messages "Station B Search Invalid".	
3	Record the first "Timelap" (T1).	Recorded time must be within 90-100 seconds_____sec.	
4	Depress "Timelap" button as soon as "Station B Search Invalid" messages has ended.	No change in status.	
5	Record second "Timelap" (T2).	Record the differences between T2 and T1. Their difference must be within 10-15 seconds_____sec.	
		Indicate pass, when all expected results are observed_____.	

7.5 Station C Tests

7.5.1 Station C Door 1 Open Button

Purpose	To determine door 1 and FES race condition, station C door 1 will not open while FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the FES "open" pushbutton at Station C "User" panel and wait ½ second, then depress "Door 1" "open" pushbutton at Station C "Door 1" panel.	Listen for an audible error indication from Station C "Door 1" panel.	
		Observe FES opened green **ON,** at Chain-A & B control panel.	
		Observe Station C "Door 1" closed green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.2 Station C Door 1 and FES Open Button

Purpose	To determine door 1 and FES race condition, station C FES will not open while door 1 is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Ready" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Door 1" "Open" pushbutton at Station C "Door 1" panel and wait ½ second, then depress FES "Open" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station C "Door 1" closed green **ON,** at Chain-A control panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.3 Station C Door 2 Lock and FES Opened

Purpose	To determine station C door 2 will not Unlocked while Station C FES is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the Station C "Door 2" "Unlock" pushbutton, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe Station C "Door 2" Locked green **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.4 Station C Door 2 Unlocked and FES Not Open

Purpose	To determine station C FES will not open while Station C door 2 is unlocked.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state • Establish Station C "Door 2" Unlocked		
Steps	**Action**	**Expected Results**	**Comments**
		Observe Station C "Door 2" UnLocked green **ON,** at Chain-A & B control panel.	
1	Depress the Station C FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.5 Station C APS Permit

Purpose	To determine station C FES will close and will not open while Station C "APS" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station C "APS" key to the right then to the left to disable APS permit, at Chain-A & B control panel.	Observe Station C "APS" disabled red **ON,** at Chain-A & B control panel.	
2	Depress the Station C FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.6 Station C User Permit

Purpose	To determine Station C FES will close and lose Station C search when Station C "User" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Turn Station C "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Observe Station C "User" disabled red **ON,** at Chain-A & B control panel.	
		Observe Station C "Search" disabled red **ON,** at Chain-A & B control panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.7 Station C Search Button 2 Search Sequence

Purpose	To determine Station C "Search and Secure" will not start with pushing Search Button 2 (SB2) .		
Setup Conditions	• Enable all permits • Establis h Stations C ready for "Search and Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
		Observe station C "SB2" lamp OFF, at the Chain-A panel.	
1	Turn ON station C "SB2", at the Chain-A panel.	Observe no change of status.	
		Indicate pass, when all expected results are observed_____.	

7.5.8 Station C Door 1 Search Pending

Purpose	To determine Station C "Search" pending "Search Button 1" lamp will stop flashing when Station C door 1 is closed.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "Door 1" closed switch, at the Chain-A panel.	Observe station C "Door 1" closed switch ON, at the Chain-A panel.	
		Observe station C "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.9 Station C Door 1 Search Abort

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Turn ON station C "Door 1" closed switch, at the Chain-A panel.	Observe station C "Door 1" closed switch ON, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.10 Station C Door 2 Search Pending

Purpose	To determine Station C "Search" pending "Search Button 1" lamp will stop flashing when Station C door 2 is opened.		
Setup Conditions	• Enable all permits • Establish Station C door unlocked state • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station C "Door 2" closed switch, at the Chain-A panel.	Observe station C "Door 2" closed switch OFF, at the Chain-A panel.	
		Observe station C "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.11 Station C Door 2 Search Abort

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Station C door unlocked state • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Turn OFF station C "Door 2" closed switch, at the Chain-A panel.	Observe station C "Door 2" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.12 Station C Emergency Stop 1 Search Pending

Purpose	To determine Station C "Search" pending "Search Button 1" lamp will stop flashing when Station C Emergency Stop 1 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station C "ES1" closed switch, at the Chain-A panel.	Observe station C "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.13 Station C Emergency Stop 1 Search Abort

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Turn OFF station C "ES1" closed switch, at the Chain-A panel.	Observe station C "ES1" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.14 Station C Emergency Stop 2 Search Pending

Purpose	To determine Station C "Search" pending "Search Button 2" lamp will stop flashing when Station C Emergency Stop 2 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station C "ES2" closed switch, at the Chain-A panel.	Observe station C "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.15 Station C Emergency Stop 2 Search Abort

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Turn OFF station C "ES2" closed switch, at the Chain-A panel.	Observe station C "ES2" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.16 Station C Emergency Stop 3 Search Pending

Purpose	To determine Station C "Search" pending "Search Button 3" lamp will stop flashing when Station C Emergency Stop 3 is actuated.		
Setup Conditions	• Enable all permits • Establish Stations B "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn OFF station C "ES3" closed switch, at the Chain-A panel.	Observe station C "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.17 Station C Emergency Stop 3 Search Abort

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station B Exit Immediately".	
2	Turn OFF station C "ES3" closed switch, at the Chain-A panel.	Observe station C "ES3" closed switch OFF, at the Chain-A panel.	
		Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.18 Station C User Key Search Pending

Purpose	To determine Station C "Search" pending "Search Button 1" lamp will stop flashing when Station C User key disabled.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn Station C "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Observe station C "SB1" lamp OFF, at the Chain-A panel.	
		Indicate pass, when all expected results are observed_____.	

7.5.19 Station C User Key Search Abort

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Turn Station C "User" key completely to the left to disable User permit, at Chain-A & B control panel.	Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.20 Station C Door 1 Open While Search and Securing

Purpose	To determine while "Search and Securing" Station C, any changes of search conditions will abort the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Turn ON station C "Door 1" closed switch, at the Chain-A panel.	Observe station C "Door 1" closed switch ON, at the Chain-A panel.	
3	Turn OFF station C "Door 1" closed switch, at the Chain-A panel.	Listen for previous message to end and the new message "Station C Search Invalid" to start.	
		Indicate pass, when all expected results are observed_____.	

7.5.21 Station C Door 1 Emergency Egress 1

Purpose	To determine if a normal Emergency Egress could be perform.		
Setup Conditions	• Enable all permits • Establish Stations C Door 1 closed		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress the "Emergency Egress #1" pushbutton, in Station C enclosure.	Observe Door 1 open, Station C enclosure.	
		Observe on Chain-A PC monitor fault #474.	
2	Depress open pushbutton, at Station C Door 1 panel.	Observe no change in status.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor" and "Ser/Maj" green LEDs are steady ON.	
		Indicate pass, when all expected results are observed_____.	

7.5.22 Station C Search Time Interval

Purpose	To determine that the search message will annunciate for a predetermined time interval, during the "Search and Secure" procedure.		
Setup Conditions	• Enable all permits • Establish Stations C "Search and Secure" pending SB1 flashing		
Steps	**Action**	**Expected Results**	**Comments**
		Observe station C "SB1" lamp flashing, at the Chain-A panel.	
1	Simultaneously start "Stopwatch" and turn ON station C "SB1", at the Chain-A panel.	Listen for a repeated messages "Searching Station C Exit Immediately".	
2	Depress "Stopwatch" "Timelap" button as soon as "Station C Search Invalid" message starts.	Listen for a repeated messages "Station C Search Invalid".	
3	Record the first "Timelap" (T1).	Recorded time must be within 90-100 seconds_____sec.	
4	Depress "Timelap" button as soon as "Station C Search Invalid" messages has ended.	No change in status.	
5	Record second "Timelap" (T2).	Record the differences between T2 and T1. Their difference must be within 10-15 seconds_____sec.	
		Indicate pass, when all expected results are observed_____.	

8 System Fault and Permit Tests

8.1 Purpose

To determine if a critical device will close and will not open while its permit is disabled, and when fault is present.

8.2 Initial conditions below apply to all tests in this section

- **PS1 Opened**
- **PS2, SS1 and SS2 Closed**
- **Pulled out all station "Emergency Stop" buttons**
- **Reset Minor, Serious and Major faults**

8.2.1 Chain-A Global Online Permit

Purpose	To determine the FES will close and will not open while "Chain A global online" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable Chain-A global online permit, at Chain-A & B control panel.	Observe "Global Online" green **OFF,** at Chain-A & B control panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

8.2.2 Chain-B Global Online Permit

Purpose	To determine the FES will close and will not open while "Chain B global online" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable Chain-B global online permit, at Chain-A & B control panel.	Observe "Global Online" red **ON,** at Chain-A & B control panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

8.2.3 Chain-A <3psi Feedback Permit

Purpose	To determine the FES will close and will not open while "Chain A <3psi Feedback" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable Chain-A <3psi feedback permit, at Chain-A & B control panel.	Observe FES closed red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

8.2.4 Chain-B <3psi Feedback Permit

Purpose	To determine the FES will close and will not open while "Chain B <3psi Feedback" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable Chain-B <3psi feedback permit, at Chain-A & B control panel.	Observe FES closed red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
3	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

8.2.5 FES FEEPS Permit

Purpose	To determine the FES will close and will not open while "FEEPS" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable FEEPS permit, at Chain-A & B control panel.	Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe FEEPS red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

8.2.6 FES ACIS Permit

Purpose	To determine the FES will close and will not open while "ACIS" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable ACIS permit, at Chain-A & B control panel.	Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe ACIS red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

8.2.7 FES >60psi Permit

Purpose	To determine the FES will close and will not open while "FES >60psi" permit is disabled.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Disable FES >60psi permit, at Chain-A & B control panel.	Observe FES closed red **ON,** at Chain-A & B control panel.	
2	Depress the Station A FES "Open" button, at Chain-A & B control panel.	Listen for an audible error indication from xxxx panel.	
		Observe FES closed red **ON,** at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

9 Serious Fault Associated with Front End Shutter Tests

9.1 Purpose

To determine if PLC will generate a Serious Fault and maintain Storage Ring (SR) permit, when a critical device of the FES fails.

9.2 Initial conditions below apply to all tests in this section

- **PS1, PS2, SS1 and SS2 Closed**
- **Pulled out all station "Emergency Stop" buttons**
- **Reset Minor, Serious and Major faults**

9.3 Front End Shutter Switch Chain-A Serious Fault

9.3.1 PS1 No Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A PS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS1 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.2 PS1 Both Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A PS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS1 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.3 PS1 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A PS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS1 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.4 PS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.5 PS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.6 PS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.7 SS1 No Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.8 SS1 Both Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.9 SS1 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, Chain-A SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.10 SS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.11 SS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.3.12 SS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-A SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4 Front End Shutter Switch Chain-B Serious Fault

9.4.1 PS1 No Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B PS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS1 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.2 PS1 Both Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B PS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS1 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.3 PS1 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B PS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS1 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.4 PS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.5 PS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.6 PS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.7 SS1 No Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.8 SS1 Both Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.9 SS1 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.10 SS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, when Chain-B SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.11 SS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, Chain-B SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

9.4.12 SS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Serious fault and maintain Storage Ring permit, Chain-B SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **ON**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Serious" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10 Major Fault Associated with Front End Shutter Tests

10.1 Purpose

To determine if PLC will generate a Major Fault and remove Storage Ring (SR) permit, when a critical device of the FES fails.

10.2 Initial conditions below apply to all tests in this section

- **PS1 Opened**
- **PS2, SS1 and SS2 Closed**
- **Pulled out all station "Emergency Stop" buttons**
- **Reset Minor, Serious and Major faults**

10.3 Front End Shutter Switch Chain-A Major Fault Station A

10.3.1 PS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.2 PS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.3 PS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.4 SS1 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.5 SS1 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.6 SS1 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, Chain-A SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.7 SS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.8 SS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.3.9 SS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4 Front End Shutter Switch Chain-B Major Fault Station A

10.4.1 PS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.2 PS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.3 PS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.4 SS1 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.5 SS1 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.6 SS1 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.7 SS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.8 SS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, Chain-B SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.4.9 SS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, Chain-B SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station A "Not Secure" state • Establish Stations B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5 Front End Shutter Switch Chain-A Major Fault Station B

10.5.1 PS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.2 PS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.3 PS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.4 SS1 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.5 SS1 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.6 SS1 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, Chain-A SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.7 SS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.8 SS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.5.9 SS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6 Front End Shutter Switch Chain-B Major Fault Station B

10.6.1 PS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.2 PS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.3 PS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.4 SS1 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.5 SS1 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.6 SS1 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.7 SS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.8 SS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, Chain-B SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.6.9 SS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, Chain-B SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station B "Not Secure" state • Establish Stations A and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7 Front End Shutter Switch Chain-A Major Fault Station C

10.7.1 PS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.2 PS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.3 PS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.4 SS1 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.5 SS1 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.6 SS1 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, Chain-A SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.7 SS2 No Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A closed switch and open it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.8 SS2 Both Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A opened switch and close it, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.7.9 SS2 Mixup Switch

Purpose	To determine the Chain-A PLC will generate a Major fault and remove Storage Ring permit, when Chain-A SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-A and create mixup, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8 Front End Shutter Switch Chain-B Major Fault Station C

10.8.1 PS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.2 PS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.3 PS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B PS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate PS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.4 SS1 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.5 SS1 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.6 SS1 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS1 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS1 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.7 SS2 No Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS2 No Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B closed switch and open it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.8 SS2 Both Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS2 Both Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B opened switch and close it, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

10.8.9 SS2 Mixup Switch

Purpose	To determine the Chain-B PLC will generate a Major fault and remove Storage Ring permit, when Chain-B SS2 Mixup Switch occurs.		
Setup Conditions	• Enable all permits • Establish Station C "Not Secure" state • Establish Stations A and B "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Locate SS2 Chain-B and create mixup, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11 Fault Associated with Stations and Integral Shutter Switch

11.1 Purpose

To determine PLC will generate a Major Fault and remove Storage Ring (SR) permit, when a critical device of stations and integral shutter switch fails. In addition, Minor fault and Serious will generate, when stations are not Beam Active.

11.2 Initial conditions below apply to all tests in this section

- **PS1 Opened**
- **PS2, SS1 and SS2 Closed**
- **Pulled out all station "Emergency Stop" buttons**
- **Reset Minor, Serious and Major faults**

11.3 Station A Faults

11.3.1 Station-A Emergency Stop 1 Chain-A Major Fault

Purpose	To determine while station A is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES1 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.2 Station-A Emergency Stop 1 Chain-A Minor Fault

Purpose	To determine while station A is secured, Chain-A will generate a minor fault, when its "Emergency Stop #1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES1 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.3 Station-A Emergency Stop 2 Chain-A Major Fault

Purpose	To determine while station A is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES2 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.4 Station-A Emergency Stop 2 Chain-A Minor Fault

Purpose	To determine while station A is secured, Chain-A will generate a minor fault, when its "Emergency Stop #2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES2 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.5 Station-A Emergency Stop 1 Chain-B Major Fault

Purpose	To determine while station A is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.6 Station-A Emergency Stop 1 Chain-B Minor Fault

Purpose	To determine while station A is secured, Chain-B will generate a minor fault, when its "Emergency Stop #1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.7 Station-A Emergency Stop 2 Chain-B Major Fault

Purpose	To determine while station A is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.8 Station-A Emergency Stop 2 Chain-B Minor Fault

Purpose	To determine while station A is secured, Chain-B will generate a minor fault, when its "Emergency Stop #2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES2 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.9 Station-A Door 1 Chain-B Major Fault

Purpose	To determine while station A is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.10 Station-A Door 1 Chain-B Minor Fault

Purpose	To determine while station A is secured, Chain-B will generate a minor fault, when "Door 1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 1 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.11 Station-A Door 2 Chain-B Major Fault

Purpose	To determine while station A is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 2 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.12 Station-A Door 2 Chain-B Minor Fault

Purpose	To determine while station A is secured, Chain-B will generate a minor fault, when "Door 2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 2 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.13 Station-A Door 3 Chain-B Major Fault

Purpose	To determine while station A is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 3" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 3 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.14 Station-A Door 3 Chain-B Minor Fault

Purpose	To determine while station A is secured, Chain-B will generate a minor fault, when "Door 3" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 3 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.15 Station-A Door 1 Chain-A Major Fault

Purpose	To determine while station A is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 1 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.16 Station-A Door 1 Chain-A Minor Fault

Purpose	To determine while station A is secured, Chain-A will generate a minor fault, when "Door 1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 1 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.17 Station-A Door 2 Chain-A Major Fault

Purpose	To determine while station A is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 2 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.18 Station-A Door 2 Chain-A Minor Fault

Purpose	To determine while station A is secured, Chain-A will generate a minor fault, when "Door 2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 2 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.19 Station-A Door 3 Chain-A Major Fault

Purpose	To determine while station A is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 3" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 3 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.3.20 Station-A Door 3 Chain-A Minor Fault

Purpose	To determine while station A is secured, Chain-A will generate a minor fault, when "Door 3" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 3 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4 Station B Faults

11.4.1 Station-B Emergency Stop 1 Chain-A Major Fault

Purpose	To determine while station B is B Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES1 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.2 Station-B Emergency Stop 1 Chain-A Minor Fault

Purpose	To determine while station B is secured, Chain-A will generate a minor fault, when its "Emergency Stop #1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES1 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.3 Station-B Emergency Stop 2 Chain-A Major Fault

Purpose	To determine while station B is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES2 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.4 Station-B Emergency Stop 2 Chain-A Minor Fault

Purpose	To determine while station B is secured, Chain-A will generate a minor fault, when its "Emergency Stop #2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES2 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.5 Station-B Emergency Stop 3 Chain-A Major Fault

Purpose	To determine while station B is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #3" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES3 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.6 Station-B Emergency Stop 3 Chain-A Minor Fault

Purpose	To determine while station B is secured, Chain-A will generate a minor fault, when its "Emergency Stop #3" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES3 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.7 Station-B Emergency Stop 1 Chain-B Major Fault

Purpose	To determine while station B is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.8 Station-B Emergency Stop 1 Chain-B Minor Fault

Purpose	To determine while station B is secured, Chain-B will generate a minor fault, when its "Emergency Stop #1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.9 Station-B Emergency Stop 2 Chain-B Major Fault

Purpose	To determine while station B is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.10 Station-B Emergency Stop 2 Chain-B Minor Fault

Purpose	To determine while station B is secured, Chain-B will generate a minor fault, when its "Emergency Stop #2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES2 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.11 Station-B Emergency Stop 3 Chain-B Major Fault

Purpose	To determine while station B is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #3" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES3 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.12 Station-B Emergency Stop 3 Chain-B Minor Fault

Purpose	To determine while station B is secured, Chain-B will generate a minor fault, when its "Emergency Stop #3" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES3 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.13 Station-B Door 1 Chain-B Major Fault

Purpose	To determine while station B is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.14 Station-B Door 1 Chain-B Minor Fault

Purpose	To determine while station B is secured, Chain-B will generate a minor fault, when "Door 1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 1 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.15 Station-B Door 2 Chain-B Major Fault

Purpose	To determine while station B is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 2 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.16 Station-B Door 2 Chain-B Minor Fault

Purpose	To determine while station B is secured, Chain-B will generate a minor fault, when "Door 2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 2 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.17 Station-B Door 1 Chain-A Major Fault

Purpose	To determine while station B is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 1 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.18 Station-B Door 1 Chain-A Minor Fault

Purpose	To determine while station B is secured, Chain-A will generate a minor fault, when "Door 1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 1 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.19 Station-B Door 2 Chain-A Major Fault

Purpose	To determine while station B is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 2 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.4.20 Station-B Door 2 Chain-A Minor Fault

Purpose	To determine while station B is secured, Chain-A will generate a minor fault, when "Door 2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 2 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5 Station C Faults

11.5.1 Station-C Emergency Stop 1 Chain-A Major Fault

Purpose	To determine while station C is B Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES1 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.2 Station-C Emergency Stop 1 Chain-A Minor Fault

Purpose	To determine while station C is secured, Chain-A will generate a minor fault, when its "Emergency Stop #1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES1 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.3 Station-C Emergency Stop 2 Chain-A Major Fault

Purpose	To determine while station C is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES2 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.4 Station-C Emergency Stop 2 Chain-A Minor Fault

Purpose	To determine while station C is secured, Chain-A will generate a minor fault, when its "Emergency Stop #2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES2 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.5 Station-C Emergency Stop 3 Chain-A Major Fault

Purpose	To determine while station C is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Emergency Stop #3" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES3 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.6 Station-C Emergency Stop 3 Chain-A Minor Fault

Purpose	To determine while station C is secured, Chain-A will generate a minor fault, when its "Emergency Stop #3" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A ES3 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.7 Station-C Emergency Stop 1 Chain-B Major Fault

Purpose	To determine while station C is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.8 Station-C Emergency Stop 1 Chain-B Minor Fault

Purpose	To determine while station C is secured, Chain-B will generate a minor fault, when its "Emergency Stop #1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.9 Station-C Emergency Stop 2 Chain-B Major Fault

Purpose	To determine while station C is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.10 Station-C Emergency Stop 2 Chain-B Minor Fault

Purpose	To determine while station C is secured, Chain-B will generate a minor fault, when its "Emergency Stop #2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES2 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.11 Station-C Emergency Stop 3 Chain-B Major Fault

Purpose	To determine while station C is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Emergency Stop #3" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES3 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.12 Station-C Emergency Stop 3 Chain-B Minor Fault

Purpose	To determine while station C is secured, Chain-B will generate a minor fault, when its "Emergency Stop #3" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B ES3 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.13 Station-C Door 1 Chain-B Major Fault

Purpose	To determine while station C is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 1 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.14 Station-C Door 1 Chain-B Minor Fault

Purpose	To determine while station C is secured, Chain-B will generate a minor fault, when "Door 1" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 1 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.15 Station-C Door 2 Chain-B Major Fault

Purpose	To determine while station C is Beam Active, Chain-B will remove Storage Ring permit and FES will close when its "Door 2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 2 circuit, at Chain-A & B control panel.	Observe Chain-B Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-B Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.16 Station-C Door 2 Chain-B Minor Fault

Purpose	To determine while station C is secured, Chain-B will generate a minor fault, when "Door 2" Chain-B circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-B door 2 circuit, at Chain-A & B control panel.	Observe Chain-B Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.17 Station-C Door 1 Chain-A Major Fault

Purpose	To determine while station C is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 1 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.18 Station-C Door 1 Chain-A Minor Fault

Purpose	To determine while station C is secured, Chain-A will generate a minor fault, when "Door 1" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 1 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.19 Station-C Door 2 Chain-A Major Fault

Purpose	To determine while station C is Beam Active, Chain-A will remove Storage Ring permit and FES will close when its "Door 2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Beam Active" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 2 circuit, at Chain-A & B control panel.	Observe Chain-A Storage Ring permit **OFF**, at the Chain-A & B control panel.	
		Observe Chain-A Fault #64, at Chain-A monitor.	
2	Toggle "Major" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

11.5.20 Station-C Door 2 Chain-A Minor Fault

Purpose	To determine while station C is secured, Chain-A will generate a minor fault, when "Door 2" Chain-A circuit is opened.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Open Chain-A door 2 circuit, at Chain-A & B control panel.	Observe Chain-A Fault #64, at Chain-B monitor.	
2	Toggle "Minor" key on Station A "User" panel.	Observe on Station A "User" panel, "Minor", "Serious" and "Major" LEDs are steady **ON**.	
		Indicate pass, when all expected results are observed_____.	

12 Transfer From Test Mode to Operating Mode

12.1 Purpose

To determine all critical devices are in operating mode. After transferring from test mode to operating mode, an end-to-end test shall verify all critical components are operating in its normal functions.

12.2 Initial conditions below apply to all tests in this section

- **Transfer to operating mode**

12.3 Station Operating Mode

12.3.1 Search and Secure All Stations

Purpose	To determine a normal search and secure could be perform for each Station, after transferring from test mode to operating mode.		
Setup Conditions	• Enable all permits • Establish Stations A, B and C Search Box 1 lamp flashing		
Steps	**Action**	**Expected Results**	**Comments**
1	Search and secure Station-A.	Observe a normal search and secure procedure is performed for Station-A.	
2	Search and secure Station-C.	Observe a normal search and secure procedure is performed for Station-C.	
3	Search and secure Station-C.	Observe a normal search and secure procedure is performed for Station-C.	
		Indicate pass, when all expected results are observed_____.	

12.3.2 Station A Emergency Stop Test

Purpose	To determine a normal performing function of Station A Emergency Stop buttons, after transferring from test mode to operating mode.		
Setup Conditions	• Enable all permits • Establish personnel in station A enclosure • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress ES1, in Station-A enclosure.	Observe Minor fault, at Chain-A & B monitor.	
2	Reset ES1 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
3	Depress ES2, in Station-A enclosure.	Observe Minor fault, at Chain-A & B monitor.	
4	Reset ES2 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
		Indicate pass, when all expected results are observed_____.	

12.3.3 Station B Emergency Stop Test

Purpose	To determine a normal performing function of Station B Emergency Stop buttons, after transferring from test mode to operating mode.		
Setup Conditions	• Enable all permits • Establish personnel in station B enclosure • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress ES1, in Station-B enclosure.	Observe Minor fault, at Chain-A & B monitor.	
2	Reset ES1 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
3	Depress ES2, in Station-B enclosure.	Observe Minor fault, at Chain-A & B monitor.	
4	Reset ES2 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
5	Depress ES3, in Station-B enclosure.	Observe Minor fault, at Chain-A & B monitor.	
6	Reset ES3 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
		Indicate pass, when all expected results are	

		observed_____.	

12.3.4 Station C Emergency Stop Test

Purpose	To determine a normal performing function of Station C Emergency Stop buttons, after transferring from test mode to operating mode.		
Setup Conditions	• Enable all permits • Establish personnel in station C enclosure • Establish Stations A, B and C "Secured" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Depress ES1, in Station-C enclosure.	Observe Minor fault, at Chain-A & B monitor.	
2	Reset ES1 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
3	Depress ES2, in Station-C enclosure.	Observe Minor fault, at Chain-A & B monitor.	
4	Reset ES2 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
5	Depress ES3, in Station-C enclosure.	Observe Minor fault, at Chain-A & B monitor.	
6	Reset ES3 and Minor Fault.	Observe Chain-A & B faults cleared, at Chain-A & B monitor.	
		Indicate pass, when all expected results are observed_____.	

12.4 PSS and ACIS Tests

12.4.1 Chain-B Storage Ring Permit to ACIS Trip

Purpose	To determine Chain-B Storage Ring permit will trip ACIS, when a major fault occurs.		
Setup Conditions	• Establish Stations A "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Create Chain-B Major fault, at Chain-B control panel.	Observe ACIS Chain-B trip, at ACIS control panel.	
2	Reset Chain-B Major fault, at Chain-B control panel.	Observe Chain-B Storage Ring permit **ON**, at ACIS control panel.	
		Indicate pass, when all expected results are observed_____.	

12.4.2 Chain-A Storage Ring Permit to ACIS Trip

Purpose	To determine Chain-A Storage Ring permit will trip ACIS, when a major fault occurs.		
Setup Conditions	• Establish Stations A "Not Secure" state		
Steps	**Action**	**Expected Results**	**Comments**
1	Create Chain-A Major fault, at Chain-A control panel.	Observe ACIS Chain-A trip, at ACIS control panel.	
2	Reset Chain-A Major fault, at Chain-A control panel.	Observe Chain-A Storage Ring permit **ON**, at ACIS control panel.	
		Indicate pass, when all expected results are observed_____.	

The ACIS (MCR Controller) System Representative observed that the proper bits turned off at the ACIS I/O Module for the Chain A and Chain B trip tests.

ACIS System Representative_____Date_____

12.4.3 Global On Line

Purpose	To determine the PSS system could be Global On Line, after a system validation.		
Setup Conditions	• Establish Stations A "Not Secure" state • Remove LOTO at the Front End Shutter pressure valve • Insure the system has no faults		
Steps	**Action**	**Expected Results**	**Comments**
1	If faults will not clear, contact the System Manager for further instructions.		
2	Turn system Global On Line, from MCR controller personnel.	Observe system is Globally On Line for Chain-A & B, at Chain-A & B control panel.	
		Indicate pass, when all expected results are observed_____.	

12.4.4 Final Check Out

Purpose	To put system back to operating state, insure door and system enclosures are closed and locked.		
Setup Conditions	• Establish Stations A "Not Secure" state • Insure the system has no faults		
Steps	**Action**	**Expected Results**	**Comments**
1	To be filled in????		
2			
		Indicate pass, when all expected results are observed_____.	

13 NOTES AND EXCEPTIONS

If these changes have been made to the master document, the author of the changes signs and dates below.

Author: _____ Date:_____

Section	Page #	Description	Changes made to the doc.	References	Comments	Initials of requester	Initials of authorizing personnel	Date

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